

wonder with the writer when he reads of the relative reliability of white, gilt, or black pins, that no extensive experiments appear to have been made with sulphuretted white pins—as suggested by Dr. Knaggs many years ago, which promised to retain the point and temper of the original pin.

Upon another vexed question, the “Setting of Lepidoptera,” we are glad to read among the many valuable suggestions, the candid opinion of the editor that English collectors persistently adhere to the old English style. Most of us find it just as difficult to change our style of setting as to change our hand-writing. Many of the wise suggestions in this chapter will, I fear, fall upon deaf ears, whilst many lepidopterists, perhaps, will feel that they fairly carry out one or other of the methods suggested, but, for the beginner, or for one who is really dissatisfied with his work, the suggestions are invaluable.

One could, however, wish that an even more emphatic warning as to the removal of insects too soon from the boards were included. The author insists upon it, but is hardly, it seems, in view of the importance of the matter, insistent enough. The writer has found sometimes that four weeks drying is not sufficient, and that the body may be hard sometimes long before the wings are absolutely fixed in position.

One is glad to read again the emphatic statement of the absolute necessity of sufficient “data labels,” and only regrets that the editor, whilst advising that every insect should be thus labelled individually, states that the enormous work involved in very large private collections often precludes this, to us, absolute necessity. In the case of these very large collections one can understand that this separate labelling would become quite a labour. Yet printed labels are in the market at quite a moderate price, and can be had cheaply in almost unlimited numbers. The side-labelling system alone obviously opens such a possibility to error from misplacement, etc., that it should only be allowed in cases where the better and safer plan is either unimportant, or impossible.

The last new chapter deals with “Holiday Collecting,” and brings home to all readers the advisability of “reading-up” the locality towards which their steps turn, and thus avoid the unpleasant experience of returning without at least some of the prizes of the place.

Of the remainder of the book, which is largely in its original and well-known form, there is no need to speak, except to note the correction of one or two slips that had got into the earlier edition, and the addition of a few useful incidental data to some of the “hints.”—C.R.N.B.

The Colours of Blue Butterflies.

By C. NICHOLSON.

In the course of an article in *The Country-Side*, some little time ago, the editor, Mr. E. Kay Robinson, invited suggestions as to the reasons for the somewhat varied systems of coloration in British “blues.” Being myself too busy at the time to think about it, I let it slide, until, in a recent number, Mr. C. W. Colthrup recorded that he had, on one occasion, noticed a kestrel, and on another occasion a pair of furze-chats, picking male *Agriades corydon* off the grass-stems on which they had settled for the night, and he put this forward as an

instance in which the theory of warning coloration, suggested by Mr. Robinson to account for the colour of the blue males, had failed. This brought the whole question to my notice again, and I now venture with much trembling to "rush in where angels fear to tread"—at least, I gather from back numbers of *The Entomologist* and *The Entomologist's Record*, that they have feared hitherto, as there is no article of any kind dealing with the subject, so far as I can trace—and raise the whole question, with our editor's permission, as a very desirable one for discussion, during which, perhaps, some readers who have been devoting their attention to raking in all the weirdest varieties, aberrations, gynandromorphs, and other monstrosities they can get the net over, rather than to finding out the why and wherefore of the differentiated colouring of their victims, may be able to advance some theories, or, at least, record some experiences, which will help some of our more brainy brethren to put together a working hypothesis.

In the introduction to vol. ii., *British Noctuae and their Varieties*, our editor gives (p. vi.) two tables of genetic development of pigment colours as follows: (1) white, yellow, orange, red, brown, black, (2) white, yellow, green, red (or brown), purple (or blue), black. Now, it is remarkable that our British "blues" can show among them every one of these colours, except yellow, which, I think, is not present in a pure form, say gamboge or canary-yellow, in any species. From this, it seems to me probable that the ancestral "blue" was more probably white than blue or brown, and that the latter colours, the prevailing ones nowadays, were developed by natural selection, for I do not think there can be much doubt that sexual selection, from the point of view of colour, is practically non-existent among butterflies, although I believe it is exercised in at least one other direction; but that is another story.

Now, according to the Darwinian theory, colours are brightest as a rule in the more active sex, and duller in the other, the arrangement being turned to account by sexual selection in one case, and by protective coloration the outcome of natural selection in the other; this, of course, is speaking broadly. Granting then that the bright colour of the male blues is the result of great activity, and that sexual selection plays no part, the two alternatives are: (1) they are blue because they have reached the highest stage of development in colour, or (2) they are blue because blue is a useful colour to them for protective purposes. Assuming the latter is the case, then the blue is either a warning colour, proclaiming their uneatableness; or it is a mimicking colour, causing them to resemble some other creature which is uneatable; or it is a protective colour in the sense that it enables them to escape detection by causing them to appear similar to some inanimate object when at rest temporarily with their wings open. I do not think it can be a warning colour, because as a rule red or yellow, often in conjunction with black, are the usual warning colours adopted by the insect world, and I see no reason to believe that it is a mimicking colour, because I fail to see what there is to mimic. I do think, however, that it may be a protective colour in enabling the butterflies, when settled with wings expanded, to resemble some blue flowers, especially as they often settle on the tops of grass stems or long stalked small flowers, which they entirely hide and take the place of. I also think that, when flitting rapidly about, the blue colour causes a flickering effect,

and so renders the butterflies elusive to any bird with designs on their lives, although I frankly confess that I have never seen a bird attempt to catch a "blue," or even to chase one. These remarks apply more particularly to the males of *Plebeius aegon*, *Everes argiades*, *Agriades bellargus*, *Polyommatus icarus* and *Cyaniris semiargus*, but not to *Agriades corydon*. There is nothing particularly flickering about the flight of this species, so far as I am acquainted with it; I should rather call it floppy. I am at a loss to suggest a reason for its distinct style of coloration, except that it, perhaps, more often frequents exposed places where the grass has grown rank, and has been bleached and partly dried by the sun to a sort of general whitish-green hue which the butterfly resembles. All the females of these species have a strong family likeness, although the blue of their respective lords exhibits so much variety, and I think this points undoubtedly to the adoption of the brown colour (again the highest in its series) for protective purposes, to render the sex less conspicuous, which is helped by their more sluggish habits and more lowly flight. In the case of *A. bellargus* I suggest that the blueness of the females in broods which have fed up in cold and inclement springs, may be due to a weakness of that sex, induced by such conditions allowing the influence of the males to predominate, and so by hereditary tendency cause a suffusion of blue. I understand that "the further south one goes with this species the less blue one gets," and this is due, if my assumption be correct, to the more vigorous conditions of the female under conditions more congenial to their development. I should expect to find also that the males of these southern females are more brilliantly and richly coloured than with us.

Now with reference to the other species, I know nothing of *Lampides boeticus* and *Lycaena arion* in a state of nature, but these, with *Cupido minimus* and *Aricia astrarche*, are distinguished by the colour resemblance between the sexes, as also is *Celastrina argiolus* to a less extent. An obvious difference in habits characterises the last-named species, and I suggest that the brightness of the blue in both sexes is protective in rendering them less conspicuous as they fly round holly-trees against the sky, and in the habit they have of soaring upwards above the holly when disturbed this blueness would also serve them; the colouring of the underside being lighter than the upper, but still blue, is of assistance in the soaring, and being then in shadow to a large extent is brought more into correspondence with the tint of the upperside; it also helps to render them inconspicuous when at rest in the bush. In the case of *Cupido minima*, which is a feeble flier, the dingy colour of both sexes is probably their best protection, but I am afraid I cannot suggest any reason for the striking coloration of *Aricia astrarche*.

The colour scheme of the underside is wonderfully similar in all the species, and seeing that all but one—I think *argiolus* is the only exception—rest or roost amongst grass and herbage, it must be admitted that the greyish or brownish ground colour, broken up by spots and splashes of lighter or darker tints, is admirably adapted to render them inconspicuous amongst the heads of the flowers or seeds of plantains, grasses, rushes and other plants which usually grow in the places they frequent. In the note by Mr. Colthrup above referred to he stated that the birds were picking off the male *A. corydon* only, and that he found the females "much more difficult to see." It struck

me that probably it was the pale worn males the birds were picking off, because these would be much more conspicuous than the females (probably freshly emerged), and even than the fresh males, and as these worn males had almost certainly fulfilled the purpose of their existence by the time they had got so worn, their loss to the species would be unimportant. I would also point out that because two species of birds have been seen to feed on *A. corydon*, it does not follow that it is an acceptable morsel to avian palates in general. The cuckoo is said to eat many kinds of hairy and otherwise unattractive caterpillars, which have been proved to be distasteful by their rejection by many other species.

Such are the ideas which have occurred to me on the colours of "blue" butterflies, and if the editor thinks them worth printing, I shall be quite prepared to find most of them ruthlessly slaughtered in succeeding numbers of the "*Record*." If, however, any one of them should turn out to be not entirely drivell, and should lead to good results in abler minds, I shall feel I have not penned them in vain.

The Orthoptera of Holland, Belgium and England.

By MALCOLM BURR, B.A., F.L.S., F.E.S., F.Z.S., etc.

One of the last publications from the pen of the late Baron de Selys-Longchamps, was the interesting little article (*Ann. Soc. Ent. Belg.*, xliii., 1899, pp. 447-451) comparing the Orthoptera Fauna of Belgium, England and Holland. His authority for the Belgian list was his own work; for the English list, the little book by the writer of this note, and for Holland, a paper entitled "*Orthoptera neerlandica*," published at Utrecht in 1899, by Mr. Tidlo Folmer. Disregarding accidental stragglers and introduced species, the author accounted for 36 British, 43 Belgian, and 31 Dutch species of truly indigenous Orthoptera. The Dutch list has recently been revised by Dr. H. W. Van der Weele of the Leyden Museum ("*Voorloopige Lijst der in Nederland waargenomen Orthoptera*," *Tijdschrift voor Entomologie*, l., 1907, pp. 129-139). It is not without interest to note a few points concerning some of the species mentioned in this list.

DERMAPTERA.—The earwigs are not referred to in either of the Dutch lists, but it is probable that, in addition to the two common species, *Forficula lesnei*, Finot, will be discovered in Holland and also in Belgium, but it is doubtful whether *Labidura riparia*, Pall., is indigenous to either country. *Chelidurella acanthopygia*, Gén , is far from rare in Belgium, but it remains to be discovered in Great Britain. I have referred to this species as a probable future addition to our list in an earlier paper (*Entom.*, vol. xxxi., p. 125, 1898). *Apterygida albipennis*, Meg., is now known to be numerous in certain localities in our eastern counties; it was recorded from Holland by Snellen van Vollenhoven, in 1846, and is locally distributed in Belgium.

DICTYOPTERA.—BLATTODEA: The three British species of *Ectobia* occur also in Belgium and Holland, and there is little or no chance of any new discoveries in the group in any of the three countries. MANTODEA: *Mantis religiosa*, L., is recorded as an accidental visitor to Belgium. Its distribution extends as far north as Fontainebleau.

ORTHOPTERA.—ACRIDIODEA: *Mecostethus grossus*, L., is indigenous to all these countries. *Stenobothrus lineatus*, Panz., is not recorded by